AVLab Tools Software Package Reduces Time and Cost in Solving Estimation Problems

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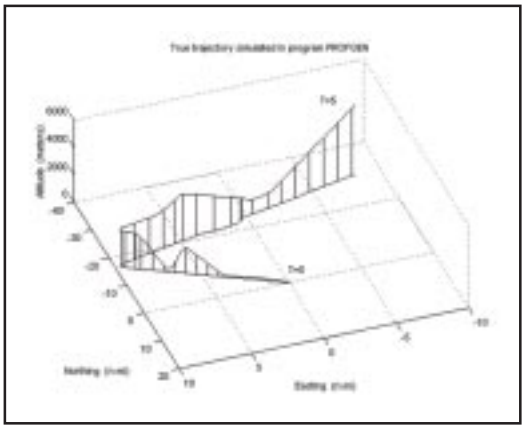

Payoff

By building a collection of simulation and analysis programs for designing and testing estimation systems and by assuring that these programs work well together, the Sensors Directorate has produced a reliable simulation product that greatly enhances engineering productivity. Engineers employing AVLab simulation products can save up to 95 percent of the time and cost normally expended in solving estimation problems.

Accomplishment

Engineers at the Sensors Directorate developed a set of computer programs that simplify building estimators for dynamic systems. These programs are bundled into a software package called AVLab Tools that has been transferred to over 300 organizations in industry and government. This user-friendly software consists of simulation and analysis programs that help an engineer create, build and test new designs, and analyze all aspects of system performance. AVLAB software has been used to design everything from a missile seeker to a hard disk controller.

Background

The need to estimate variables from measured data is prevalent in all of science and engineering. For instance, the inertial navigation system (INS) onboard an aircraft can exhibit large errors in its kinematic variables, errors that can be damped out by combining INS outputs with location measurements from a Global Positioning System (GPS) receiver. An estimator is required to make the INS and GPS systems work together. However, many challenging issues confront engineers attempting to build estimators that will perform well with affordable sensors. For example, the dynamic nature of the problem, differences in the statistical properties of the two systems, and loss of signal in the GPS receiver are all critical issues. To address mission requirements in terms of such issues, engineers must have software tools that can predict system performance for a variety of system configurations. By comparing configurations in terms of cost, performance, robustness and other factors, the most cost-effective equipment combinations can be identified. Beginning in the 1970's, Sensors Directorate engineers began to build general-purpose simulation and analysis programs to solve various parts of the estimation problem. Ultimately, they built a Monte-Carlo/covariance-analysis simulation (MSOFE), a trajectory generator (PROFGEN), a postprocessor (MPLOT), and more than a dozen support programs. Today this software forms an integrated collection, called AVLab Tools, for performance analysis of estimation systems. Programs in AVLab are mathematically correct, efficient to run, flexible, capable and compliant with diverse problem needs. MSOFE the flagship program in AVLab, conforms to diverse problems by offering a rich mixture of options to control program evolution and by requiring that the program itself be adapted to the problem. The latter strategy, which relinquishes some control of the program code to the using engineer, is different from other AVLab programs and from nearly every commercial program as well. By giving the engineer control of those portions of the program code that are unique to the problem, MSOFE can adapt to the extreme range of estimation problems that engineers face.